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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/722,115	11/25/2003	Steven D. Girouard	279.597US1	4851

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EXAMINER	
BEISNER, WILLIAM H	

ART UNIT	PAPER NUMBER
1797	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/722,115	GIROUARD ET AL.	
	Examiner	Art Unit	
	WILLIAM H. BEISNER	1797	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 December 2007 and 12 March 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-10,12-14 and 73-81* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-10,12-14 and 73-81* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/12/2008*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 9/4/2007 has been entered.

Information Disclosure Statement

2. The information disclosure statement filed 3/13/2008 has been considered and made of record.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-10, 12-14 and 73-81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dennis et al.(US 6,114,164) in view of Kofidis et al.(Journal of Thoracic and Cardio. Surg.), Farb et al.(US 6,048,722), Bursac et al.(Am. J. Physiol. 277) and Terracio et al.(In Vitro Cell. and Develop. Bio.).

The reference of Dennis et al. discloses an apparatus for emulating an in vivo environment that includes a culture module (38) to host cells and culturing medium, an electrical stimulator (14) coupled to the culturing module (38), a stress simulator (16, 18, 26, 30, 40) coupled to the culturing module and a controller (20) coupled to the electrical stimulator (14) and stress simulator (16, 18, 26, 30, 40) (See Figure 1).

Claim 1 differs by reciting that the device includes a biological treatment administration module coupled to the culture module and controller.

The reference of Kofidis et al. discloses that it is known in the art to not only mechanically stimulate cardiac cells in vitro but to also chemically stimulate the cells in vitro (See page 65, column 1, first paragraph).

The reference of Farb et al. discloses that biological treatment administration modules (14) are known in the art for automating the introduction of various chemical stimuli with respect to a biological material (32). The module (14) is coupled to a cell holding chamber (12) and controller (10).

In view of these teachings, it would of have been obvious to one of ordinary skill in the art to modify the device of the primary reference to include a biological treatment administration module for the known and expected result of allowing any cells cultured in the device of the primary reference to be additionally chemically stimulated as suggested by the reference of Kofidis et al. while allowing the automation of all the stimulation structures and detection devices.

While the reference of Dennis et al. states that the system is "for adaptively controlling a muscle tissue specimen in order to emulate its in vivo environment", Claim 1 further differs by requiring that the claimed electrical stimulator is "adapted to create cardiac electrical conditions in the culturing medium, the cardiac electrical conditions simulating electrical conditions in the myocardium that result in cardiac contraction".

The reference of Bursac et al. discloses that when culturing cardiac cells *in vitro* it is known in the art to electrically stimulate the cells using electrodes wherein the electrodes provide pacing impulses at a rate of 60 beats/min (See page H436 "Electrophysiological Assessment" and Figure 1B).

In view of this teaching, when culturing cardiac cells in the device of the primary reference of Dennis et al., it would have been obvious to one of ordinary skill in the art to "adapt" the electrical stimulator to provide the pacing disclosed by the reference of Bursac et al. as is conventional in the art for electrically stimulating cardiac cells *in vitro* and emulating an in vivo environment as is required of the reference of Dennis et al.

While the reference of Dennis et al. states that the system is "for adaptively controlling a muscle tissue specimen in order to emulate its in vivo environment", Claim 1 further differs by requiring that the claimed stress stimulator is "adapted to create a mechanical stress upon the cells, the mechanical stress simulating a tension applied upon cardiac muscle cells in the myocardium".

The reference of Terracio et al. discloses that it is conventional in the art to mechanically stimulate cardiac cells while cultured in vitro to expose the cells to tension found in vivo (See the abstract).

In view of this teaching, when culturing cardiac cells in the device of the primary reference of Dennis et al., it would have been obvious to one of ordinary skill in the art at the time the invention was made to "adapt" the mechanical stimulator to provide the mechanical tension disclosed by the reference of Terracio et al. as is conventional in the art for mechanically stimulating cardiac cells in vitro and emulating an in vivo environment as is required of the reference of Dennis et al.

With respect to the claim limitation that the biological treatment administration module "including one or more biological agents selected from protein and nucleic acid", the modules resulting from the combination of the reference of Farb et al. with Dennis et al. would result in a

structure that is capable of holding a protein or nucleic acid agent that can be communicated with the culturing module. Note positive recitation in the claims that the apparatus includes a protein or nucleic acid agent does not further patentably distinguish the structure of the claim because "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim." Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). See MPEP 2115.

With respect to the claimed "memory circuit" and "controller", the reference of Dennis et al. discloses a controller and user interface (52) that includes input devices, memory and display which allow manipulation of the conditions within the system. The additional references as discussed in the rejection of record provide the motivation for controlling the different stimulation devices for emulating the conditions found in vivo. As a result, an apparatus programmed as suggested in the rejection of record would meet the memory circuit limitations of amended claims 1

With respect to claim 2, the reference of Dennis et al. discloses electrodes (22) in the culture chamber. The reference of Bursac et al. also discloses the use of electrodes in the culture medium (See Figure 1b).

With respect to claims 3 and 4, the reference of Bursac et al. discloses that the electrodes function as a pacemaker to pace the tissue as found in vivo. The electrodes also generate an electric field.

With respect to claims 5, 6 and 74, the reference of Terracio et al. discloses culturing cardiac cells on a deformable silicone substrate when exposing the cells to mechanical stimulation (See page 53, second column) using the mechanical linkage disclosed in Figure 1.

With respect to claim 7, the device of Dennis et al. includes a variable speed motor (16) and mechanical linkage (40, 30). The reference of Terracio et al. also discloses the use of a variable speed motor and mechanical linkage (See Figure 1).

With respect to claims 8 and 75, the reference of Farb et al. discloses one or more chemical dispensers (18).

With respect to claim 9, the reference of Dennis et al. discloses a fluid perfusion system that would function as a mixer (See column 5, lines 35-38).

With respect to claims 10, 12 and 73, the reference of Dennis et al. discloses a user interface (52) that includes input device, memory and a display which allow manipulation of the conditions within the system.

With respect to claims 13 and 14, the reference of Terracio et al. also discloses that microscopic observation of the cells is conventional in the art (See page 53, second column) and would have been within the purview of one having ordinary skill so as to observe the cultured cells.

With respect to claims 76-78, the controller resulting from the combination of the references discussed in the rejection are structurally capable of providing the control and/or processing required of claims 76-78.

With respect to claim 79, the reference of Farb et al. discloses the use of imaging devices for monitoring the medium application zone (See column 9, lines 1-15) is conventional in the art and would have been obvious for the known and expected result of visually monitoring the tissue during the processing steps.

With respect to claims 80 and 81, positive recitation in the claims that the apparatus includes a protein or nucleic acid agents does not further patentably distinguish the structure of the claim because "Expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining patentability of the apparatus claim." Ex parte Thibault, 164 USPQ 666, 667 (Bd. App. 1969). See MPEP 2115.

Response to Arguments

7. With respect to the rejection of claims 1 over the combination of the references of Dennis et al.(US 6,114,164) in view of Kofidis et al.(Journal of Thoracic and Cardio. Surg.), Farb et al.(US 6,048,722), Bursac et al.(Am. J. Physiol. 277) and Terracio et al.(In Vitro Cell. and Develop. Bio.), Applicants argue (See pages 6-7 of Applicants' response filed 12/17/2007) that the rejection is improper because "Applicant is unable to find in the cited portions of Dennis, Kofidis, Farb, Bursac, and Terracio, individually or in combination, among other things, a memory circuit including an instruction set adapted to condition cells for administration into tissue of myocardium, the instruction set defining a predetermined sequence of one or more electrical, mechanical, and biological stimuli, and a controller adapted to control the cardiac electrical stimulator, the myocardial stress simulator, and the biological treatment administration module by automatically executing the instruction set". Applicants stress that none of the recited references disclose this specific claim language.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on

combinations of references. See In re Keller, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); In re Merck & Co., 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). In this case, the reference of Dennis et al. discloses a controller and user interface (52) that includes input devices, memory and display which allow manipulation of the conditions within the system. The additional references as discussed in the rejection of record provide the motivation for controlling the different stimulation devices for emulating the conditions found in vivo. As a result, an apparatus programmed as suggested in the rejection of record would meet the memory circuit limitations of amended claims 1. That is when automatically controlling a device that is suggested by the combination of references discussed above, the memory circuit of the device would be programmed to include "an instruction set defining a predetermined sequence of electrical, mechanical, and biological stimuli" since operation of the device would include automated control of the electrical, mechanical, and biological stimulation of the cultured cells. It is additionally noted that claim 1 merely recites "a predetermined sequence" but does not recite any specifics with respect to the "predetermined sequence" other than the general statement "of the electrical stimuli, the mechanical stimuli and the biological stimuli".

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The reference of Yamamoto et al.(Circulation) is cited as prior art which pertains to a computer controlled device for electrically and mechanically stimulating cardiomyocytes.

The reference of Kaye et al.(J. Clin. Invest.) is cited as prior art which pertains to the use of biological agents during the culture of cardiomyocytes.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to WILLIAM H. BEISNER whose telephone number is (571)272-1269. The examiner can normally be reached on Tues. to Fri. and alt. Mon. from 6:15am to 3:45pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gladys J. Corcoran can be reached on 571-272-1214. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/William H. Beisner/
Primary Examiner
Art Unit 1797

WHB